

Growth of the Koch Curve

Name _____ Period _____ Date _____

Stage 0 —————

Stage 1 —————

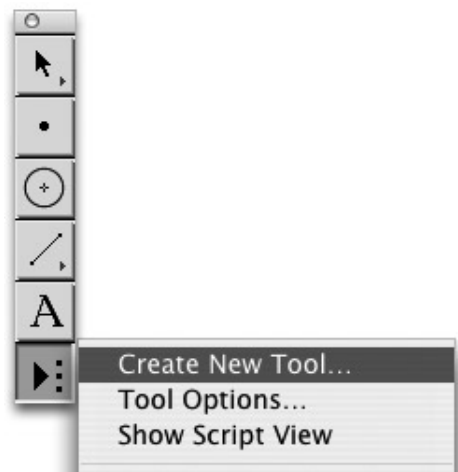
Stage 2 ———

Stage 3 —

Koch Curve with Sketchpad

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1. Open a new Sketchpad document. Choose **Preferences** from the Edit menu. On the Units panel, set the units for Distance to **cm**. On the Text panel, check Show Labels Automatically For All New Points.
2. Click on the **Segment** tool. Draw a horizontal segment (hold the shift key while drawing to keep it horizontal). Choose **Length** from the Measure menu.
3. Click on the **Selection Arrow**. Move one endpoint of the segment until the length is 27 cm, keeping the segment horizontal.
4. Select the first endpoint (*A*) and choose **Mark Center** from the Transform menu. Select the second endpoint (*B*), choose **Dilate** from the Transform menu, and dilate point *B* by a ratio of 1 to 3.
5. Choose the **Label** tool. Double-click the label of the new point (*B'*) and relabel it *C*.
6. Dilate point *B* again, this time by a ratio of 2 to 3. Label the new point *D*.
7. Mark point *C* as a center. Select point *D* and choose **Rotate** from the Transform menu. Rotate point *D* by a fixed angle of 60° . Label the new point *E*.
8. You are almost there! Use the **Segment** tool to connect the points in this order: *A*, *C*, *E*, *D*, *B*. Then, use the **Selection** tool to click on the original segment *AB*. Choose **Hide Segment** from the Display menu.
9. Measure each segment to check that they are the same length. Then, choose **Calculate** from the Measure menu and find the sum of all the segments. Click on a measure to add it to the calculation.
10. Select all the points and segments. From the Custom Tools menu, choose **Create New Tool** and name it Koch.
11. Click on white space to deselect everything. Click the **Segment** tool and choose **Select All Segments** from the Edit menu, then choose **Hide Segments** from the Display menu.
12. Now you will use the **Koch** tool to create Stage 2. Choose the **Koch** tool from the Custom Tools menu, then select each pair of points in order: *A* and *C*, *C* and *E*, *E* and *D*, and *D* and *B*. Measure several of the segments to find the lengths.
13. Repeat Steps 11 and 12 to create Stage 3 and Stage 4. *Note:* To hide the point labels, select the **Point** tool, and choose **Select All Points** from the Edit menu. Then choose **Hide Labels** from the Display menu.



Properties of Exponents

Multiplication Property of Exponents

For any values of b , m , and n ,

$$b^m \cdot b^n = b^{m+n}$$

Power Properties of Exponents

For any values a , b , m , and n ,

$$(b^m)^n = b^{mn}$$

$$(ab)^n = a^n b^n$$

Division Property of Exponents

For any nonzero value of b and any values of m and n ,

$$\frac{b^n}{b^m} = b^{n-m}$$

Negative Exponents and Exponents of Zero

For any nonzero value of b and for any value of n ,

$$b^{-n} = \frac{1}{b^n} \quad \text{or} \quad \frac{1}{b^{-n}} = b^n$$

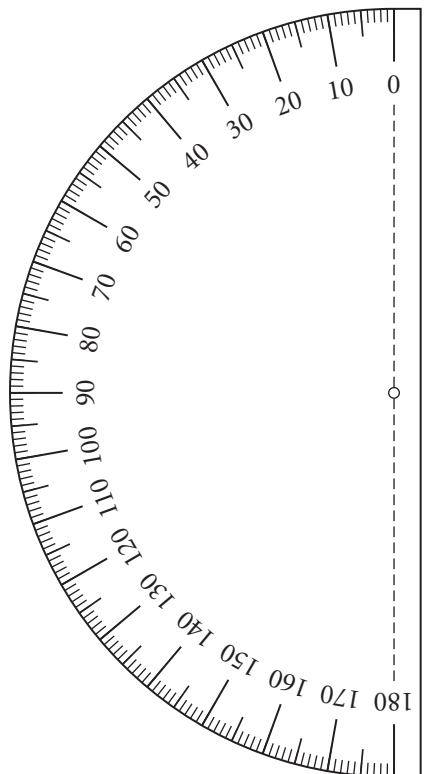
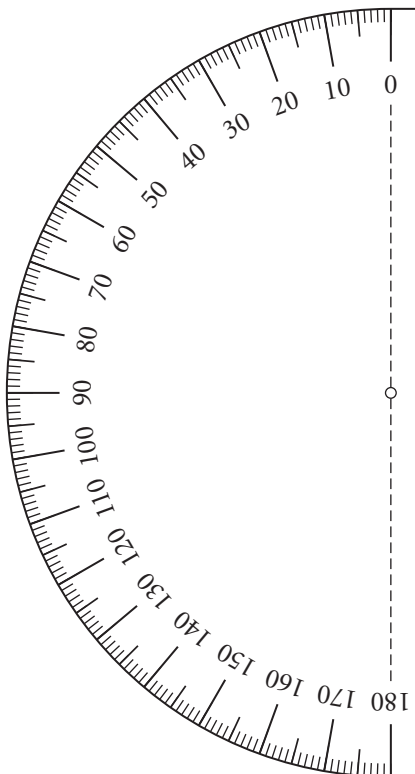
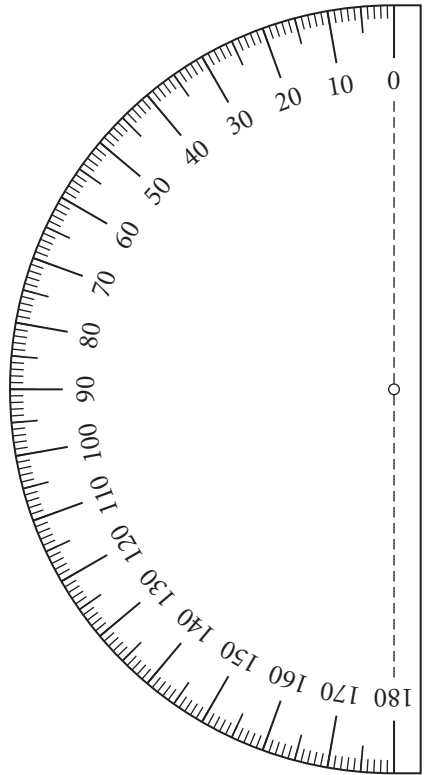
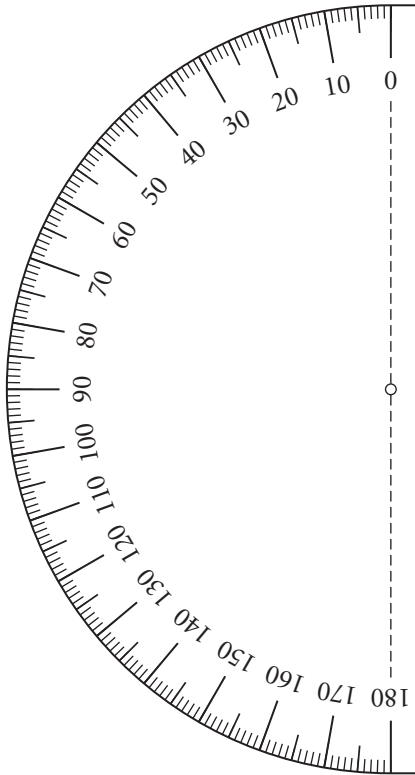
$$b^0 = 1$$

100 Grid

Name _____ Period _____ Date _____

0	1	2	3	4	5	6	7	8	9
10	11	12	13	14	15	16	17	18	19
20	21	22	23	24	25	26	27	28	29
30	31	32	33	34	35	36	37	38	39
40	41	42	43	44	45	46	47	48	49
50	51	52	53	54	55	56	57	58	59
60	61	62	63	64	65	66	67	68	69
70	71	72	73	74	75	76	77	78	79
80	81	82	83	84	85	86	87	88	89
90	91	92	93	94	95	96	97	98	99

Protractors



Radioactive Decay Sample Data

Years elapsed	Atoms remaining
0	201
1	147
2	120
3	94
4	71
5	52
6	42
7	32
8	28
9	22
10	18
11	15
12	12
13	10
14	9

Moore's Law Sample Data

Intel Processors

Processor (year released)	Years since 1971	Number of transistors
4004 (1971)	0	2,300
8080 (1974)	3	6,000
8086 (1978)	7	29,000
80286 (1982)	11	134,000
80386 DX (1985)	14	275,000
80486 DX (1989)	18	1,200,000
Pentium (1993)	22	3,100,000
Pentium Pro (1995)	24	5,500,000
Pentium II (1997)	26	7,500,000
Pentium III (2000)	29	28,000,000

(www.intel.com)

Bounce Sample Data

Bounce number	Maximum rebound height (m)
0	1.00
1	0.75
2	0.45
3	0.28
4	0.19
5	0.13
6	0.09

Pendulum Sample Data

Swing number	Maximum distance from center (m)
0	0.50
1	0.48
2	0.45
3	0.45
4	0.43
5	0.40
6	0.40
7	0.38
8	0.38
9	0.35
10	0.33
11	0.33
12	0.30
13	0.30
14	0.28
15	0.28

Swing number	Maximum distance from center (m)
16	0.25
17	0.25
18	0.25
19	0.23
20	0.23
21	0.23
22	0.20
23	0.20
24	0.18
25	0.18
26	0.18
27	0.15
28	0.15
29	0.15
30	0.15